
DRAWINGS

[Drawing 1]

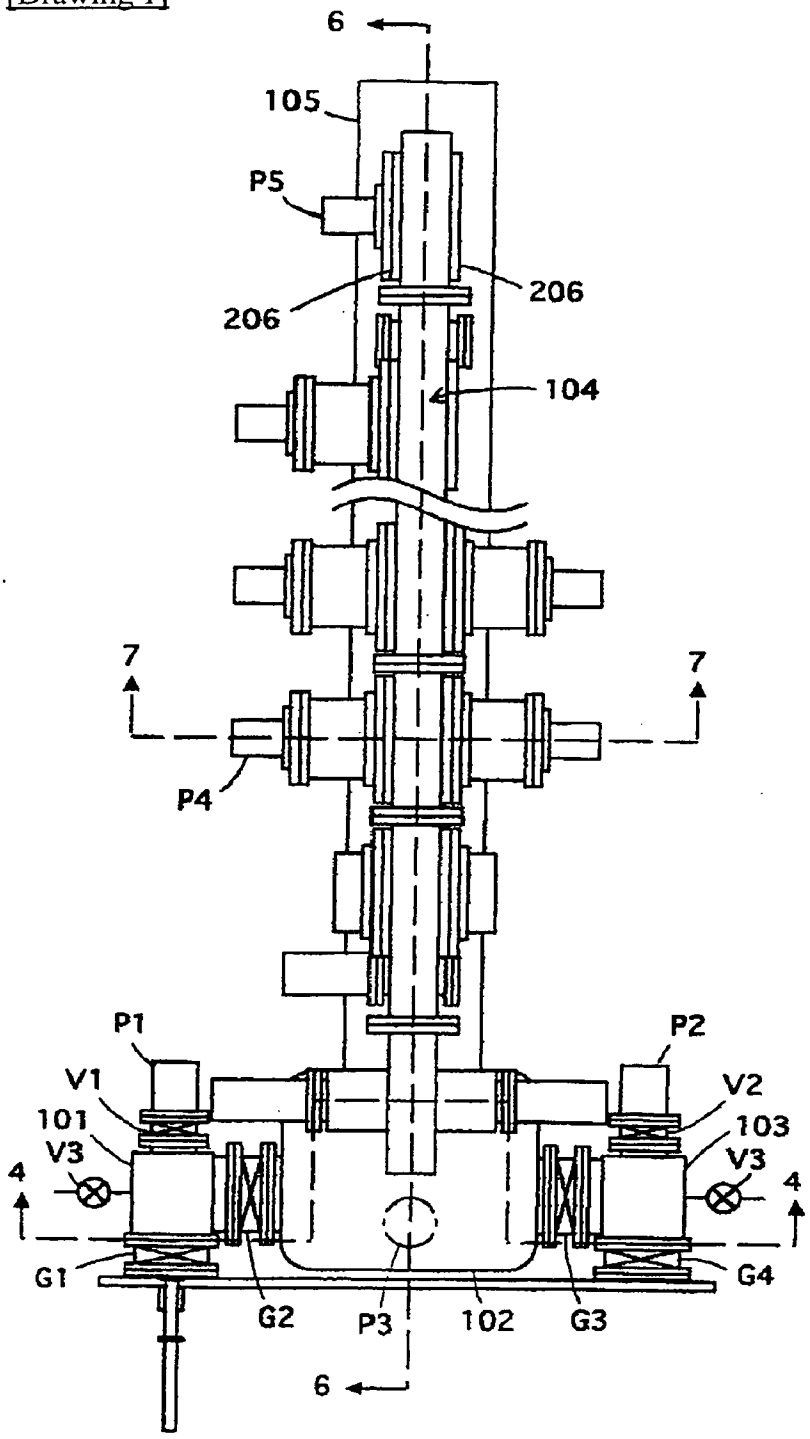

FIG. 1

[Drawing 2]

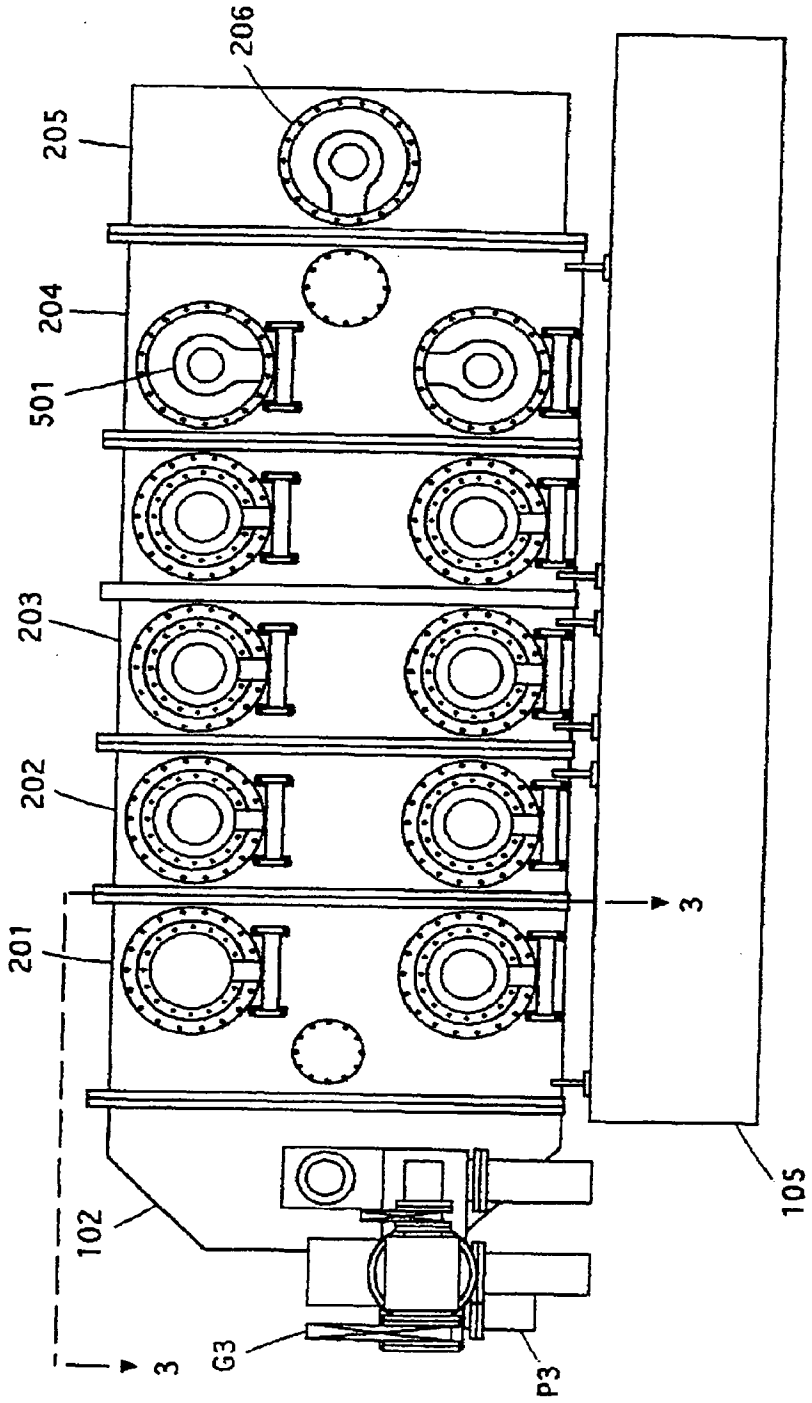

FIG. 2

[Drawing 3 A]

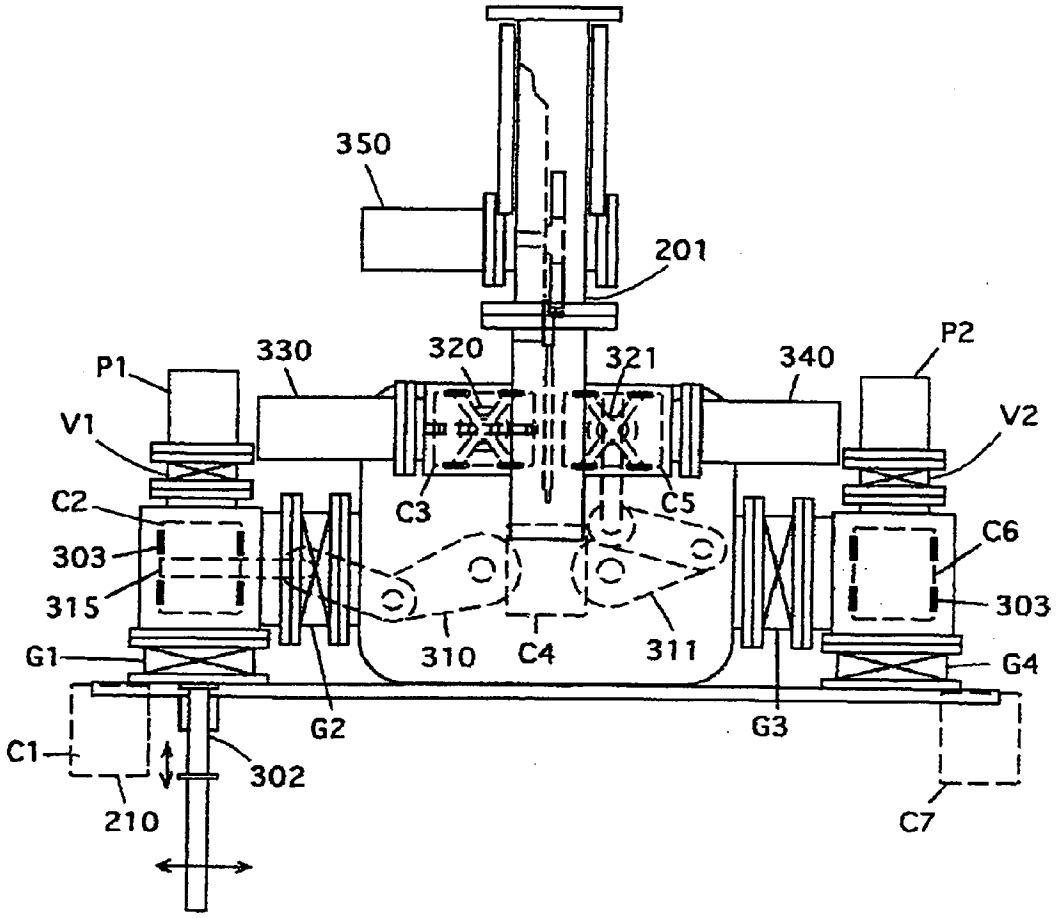

FIG. 3A

[Drawing 3 B]

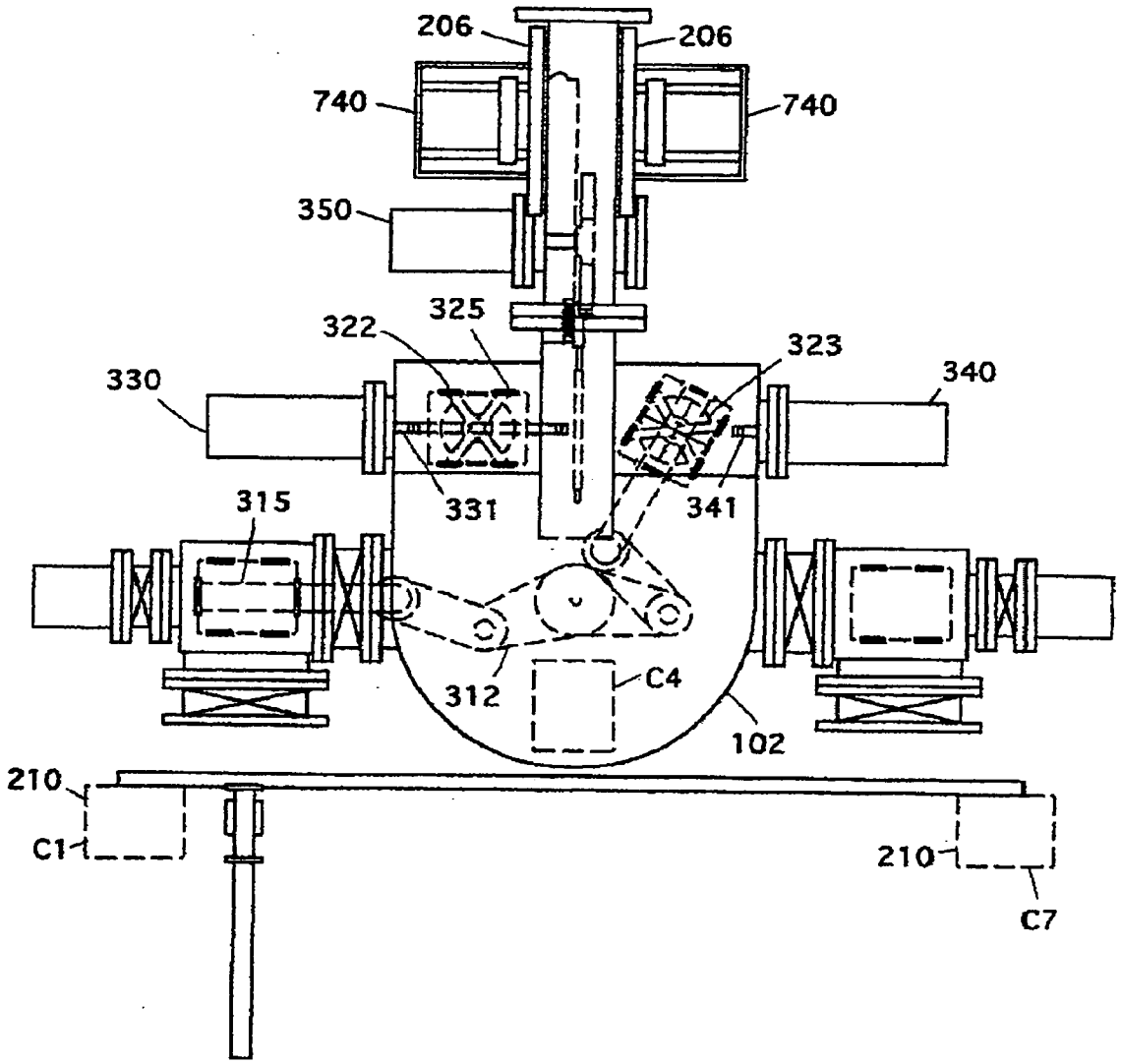

FIG. 3B

[Drawing 3 C]

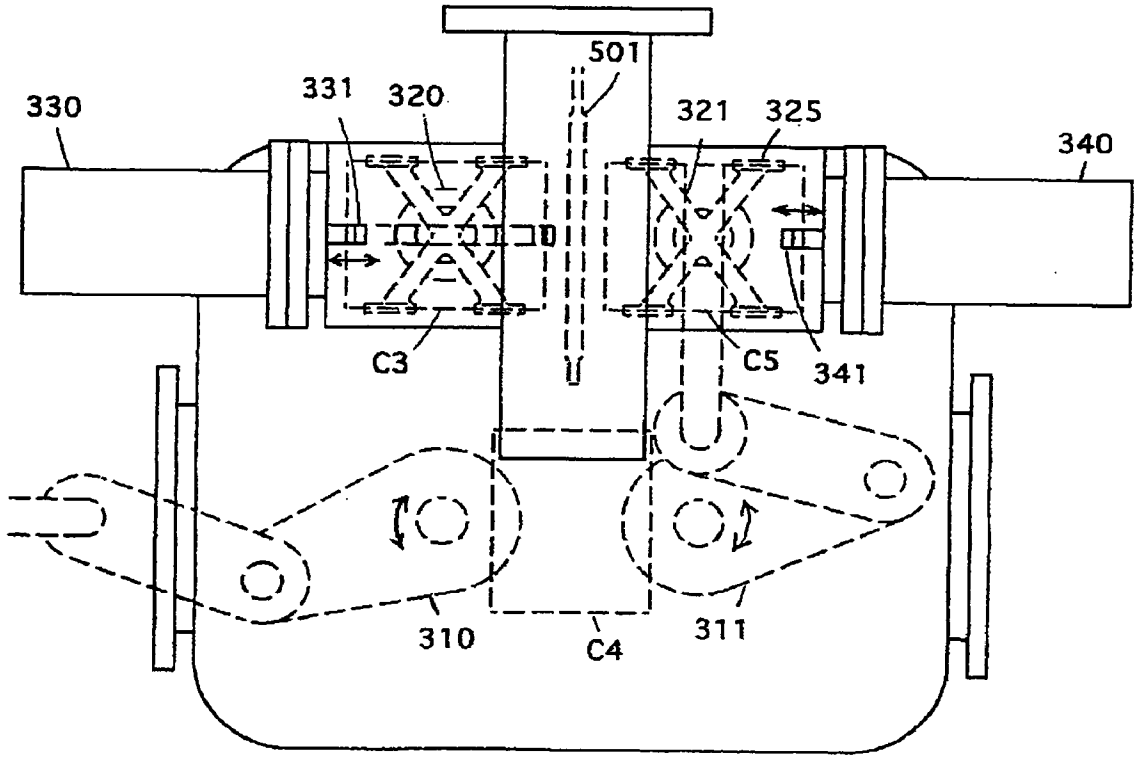

FIG. 3C

[Drawing 4]

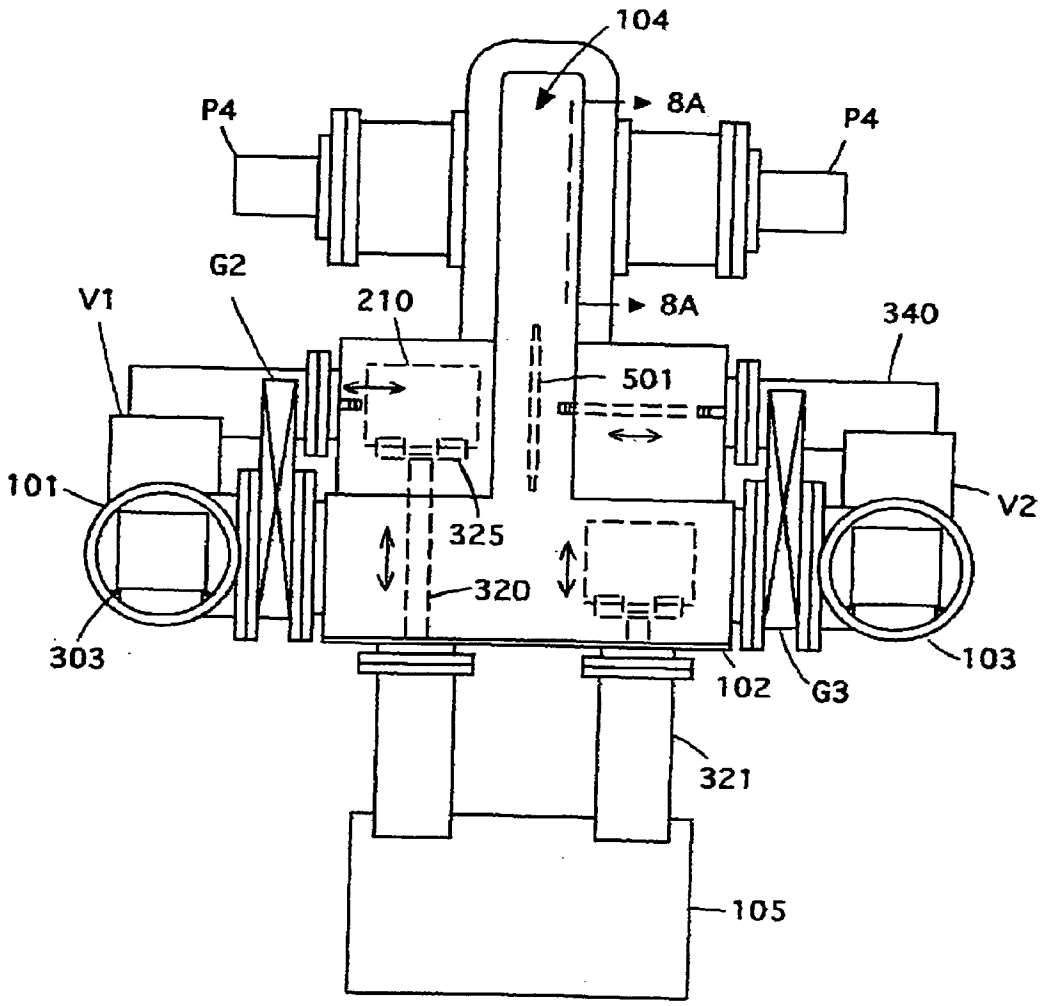

FIG. 4

[Drawing 5 A]

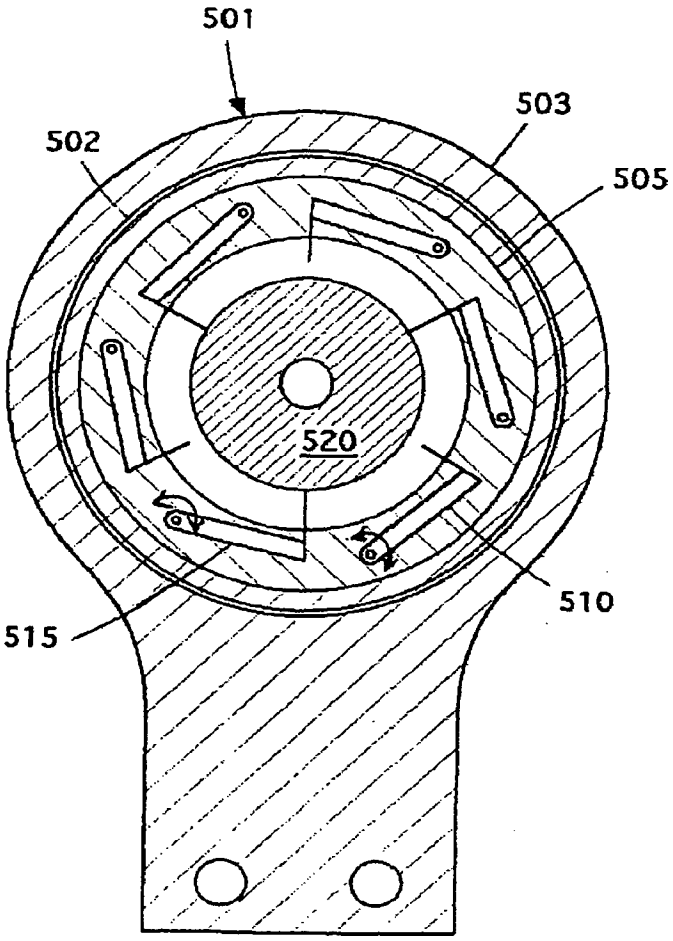

FIG. 5A

[Drawing 5 B]

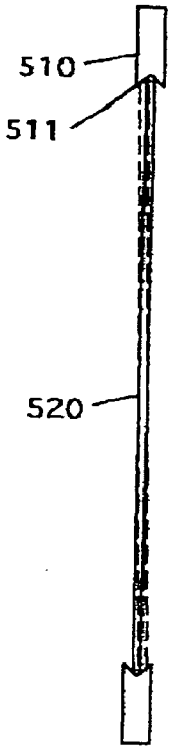

FIG. 5B

[Drawing 5 C]

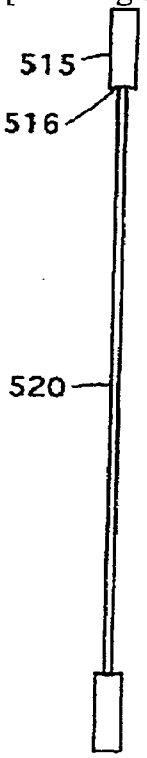

FIG. 5C

[Drawing 6]

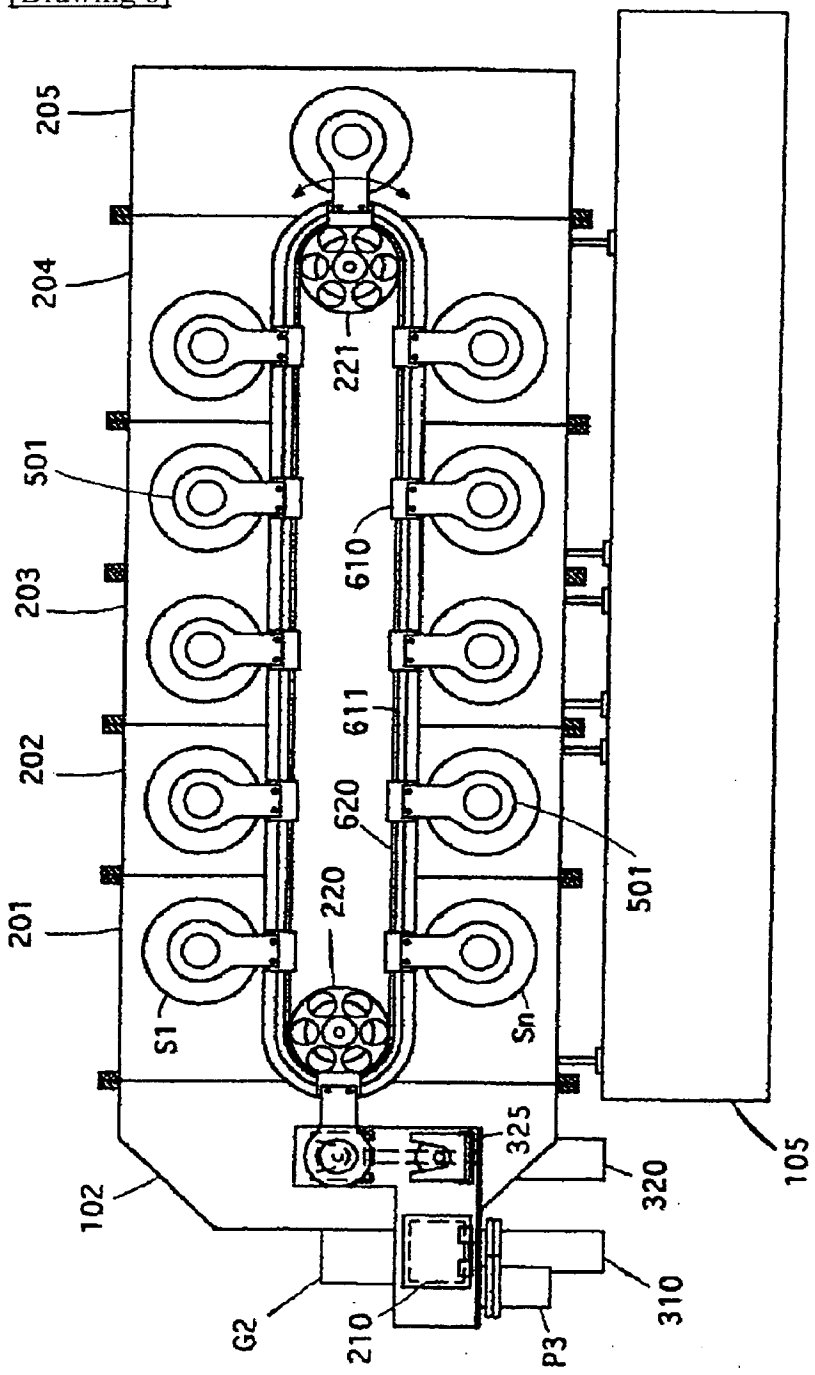

FIG. 6

[Drawing 7]

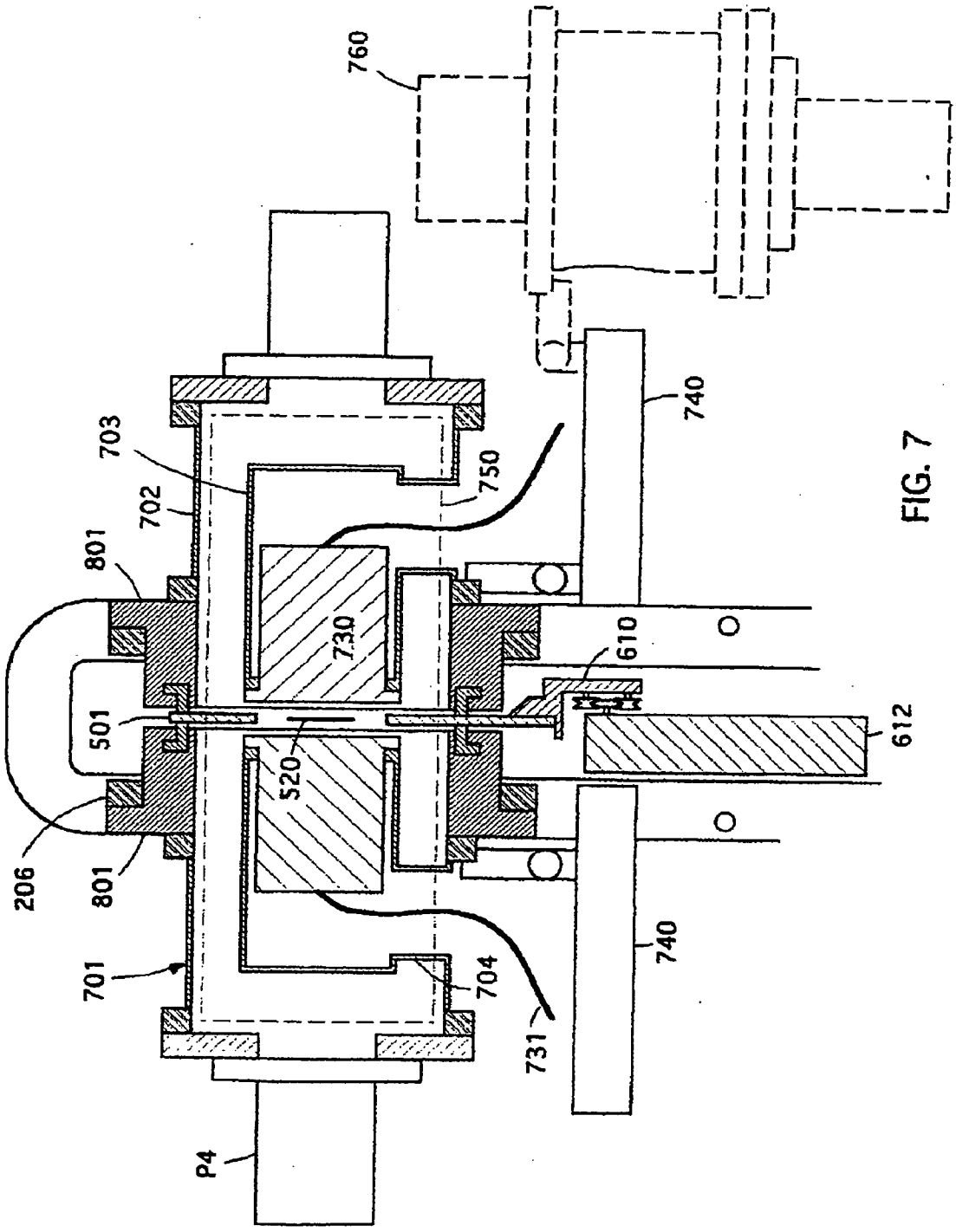

FIG. 7

[Drawing 8 A]

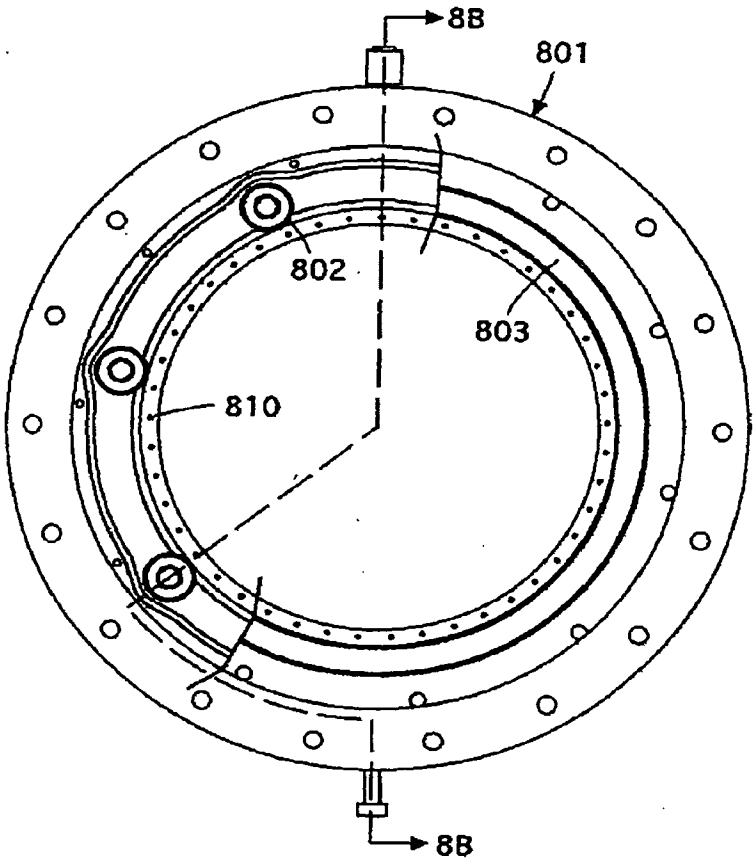

FIG. 8A

[Drawing 8 B]

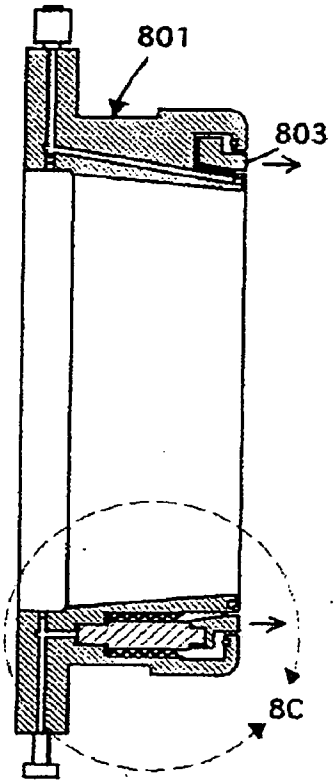

FIG. 8B

[Drawing 8 C]

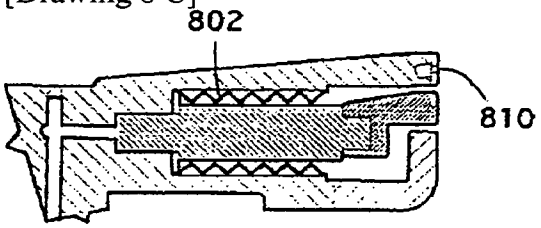

FIG. 8C

[Translation done.]* NOTICES *
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1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
Background technical field of invention This invention relates to processing of a substrate generally. Furthermore, if specified, this invention relates to processing of the automation system which deals with the thin substrate which needs thin layer coating, such as MAG and an optical disk, a wafer, a lens, and a glass panel, and the substrate in a series of processing chambers.
[0002]
Argument about the conventional technique The spatter thin film is widely used in manufacture of the MAG and an optical disk, a wafer, a lens, and a glass panel. The MAG and an optical disk are used in the large capacity storage for digital information. The competitive character of a digital store commercial scene has forced manufacturing the disk of still bigger memory capacity by the low price upon the medium manufacturer continuously. The facility used for disk manufacture must fulfill such need by offering the further reduction of facilitation of improvement in a throughput, upgrading of a product, increase of a volume, still longer available time, and a maintenance service, flexibility and the purchase price, and running cost.
[0003]
Some systems of the conventional technique which deal with and process the substrate for the MAG and optical media exist. This vacuum evaporationo system is classified into two general categories, i.e., an in-line spatter system, and a static spatter system.
[0004]
An in-line system conveys many substrates generally arranged in on a pallet. It is loaded with a pallet into atmospheric air, and it is led in a system after that. Generally, a pallet moves continuously during processing of a substrate in the inside of a system. Processing is performed in a vacuum chamber often common during migration of a pallet. Although there is an advantage of the clear improvement in a throughput in this approach, some faults also exist in coincidence. Since processing is performed while the substrate is moving relatively to the processing station, the quality of a coat and homogeneity which are applied are made into a sacrifice. Moreover, since processing is often performed within a common chamber, the processing in one station may have a bad influence on the processing in other stations. Generally a pallet is partially covered subordinately with a substrate. Since a pallet is covered repeatedly, a coat begins to come off and fall and the particle which is not desirable is produced for a substrate and a facility. Exposing a pallet to the open air after each production process worsens the problem of scar omission further. Therefore, frequently, a pallet and a transport station are large-scale and need the maintenance and cleaning which costs require.
[0005]
Generally, at once, a processing station is loaded with one substrate and a static spatter system processes it separately one by one with other substrates each substrate of whose is under processing. Moreover, between a substrate and the source of vacuum evaporationo, a relative motion does not exist in the case of processing. The component which deals with a substrate during processing is not exposed to the open air. Instead, it is loaded with a substrate into a vacuum chamber via the cell for loading, and it is transported after that on the component which deals with a substrate. It is eliminated whether the fault of an in-line system is reduced sharply in this way. The static system is equipped with the still higher engine performance for the high quality medium manufacture which a commercial scene requires although an in-line

system has the outstanding throughput.
[0006]
U.S. Pat. No. 5,215,240 given to Berg etc. supports a substrate perpendicularly, and is indicating the static spatter system which moves this substrate continuously and annularly through the inside of a system. A substrate is conveyed in a system by the conveyor system using the roller of a gear drive used as a group. Each substrate is lifted, is removed from a cassette by the blade, after that, is lifted and is conveyed from a blade to the transport station of the main chamber. Once it is carried on the stand on a main chamber transport station, sequential migration of the substrate will be carried out via the main chamber and a series of processing chambers which suited. It moves caudad, the main chamber transport station rotates a stand so that it may become the bottom of a processing station, and it moves up until a substrate is located after that in the processing chamber which is the start point of a series of processings. Each substrate is processed separately from other substrates. The processing which this lower part migration, rotation, and upper part migration followed continues until a substrate is processed completely and removed from the main chamber transport station, it is another side and continuous loading of other substrates, processing, and removal are performed. After being removed from the main chamber transport station, a substrate is placed into a cassette, and this cassette will be removed from a system through the cell for removal, if it fills.
[0007]
Many components which move within a vacuum chamber tend to have a bad influence on vacuum maintenance, and tend to generate the particle, and alignment takes cautions to them, they need a continuous maintenance service, and are not easy to approach. A high vacuum pump is located in the place which separated several feet from the processing chamber to which they perform pump movement, and gives constraint to conductance. The change on the dimension which occurs to a system by expansion and the pressure deficit lowers the dependability of migration, and makes implementation of a complicated compensation procedure unavoidable. The 3 movement index of the main chamber transport station restricts the throughput of a system, and reduces the dependability of migration. Although the some are common to other commercial static spatter systems, there are the following in other constraint.
(a) The large-sized chamber in which it is upright and a manufacturing cost does not agree with a customer's needs highly, therefore easily.
(b) The high vacuum pump which is used by one processing chamber side, and serves as an asymmetric pumping mode as a result, and brings about the pressure deficit in a chamber, and an uneven process parameter.
(c) The complicated cassette handling system which alignment is not easy, and a problem is in dependability, and generates a particle.
(d) The complicated substrate handling system which requires exact alignment and a large-scale maintenance service, and the handling mistake of a substrate and too much quiescent time tend to generate.
(e) The handling system which increases possibility that will contact a substrate several times and this will do damage to a substrate.
(f) The complicated handling system by which cost is high, reduces the vacuous quality, and makes failure discovery difficult.
(g) The handling system which needs some alterations in order to receive the different cassette and different substrate of size.
[0008]
Outline of invention The purpose of this invention is to offer the substrate handling

and processing system which have been improved.
[0009]
The further purpose of this invention is about the cassette which stored the substrate to offer the system with which it can load into a vacuum chamber, without spoiling the quality of the vacuum in a chamber.
[0010]
The further purpose of this invention generates the particle of an amount at its minimum, and is to offer the substrate handling system which does not have a bad influence on the quality of the vacuum in a system.
[0011]
The further purpose of this invention has two or more processing stations in offering the system which works to coincidence and processes a substrate sequentially according to an individual continuously to each substrate.
[0012]
The further purpose of this invention is to offer the approach of dissociating with other processings and processing each substrate.
[0013]
The further purpose of this invention is to present the location which processing can begin with the system which can arrange a substrate automatically.
[0014]
The further purpose of this invention is to offer the system equipped with high dependability, maintainability, flexibility, and operability.
[0015]
The further purpose of this invention is to offer the system which can manufacture the outstanding thin film with few defects. In addition, the purpose of this invention tackles the fault of common knowledge of the system of the conventional technique, and is to offer the next thing.
(a) The potential throughput in which the static spatter system of the conventional technique is excelled.
(b) The system which can realize the more excellent vacuum.
(c) Symmetrical high-vacuum-pump operation near [complicated / which eliminates the path which gives constraint to conductance] the processing station.
(d) The simplified processing system which suppresses the number of migration components, generating of a particle, compensation, a maintenance service, and the quiescent time to the minimum, and seldom receives effect in the dimensional change under operation to a system.
(e) It is the system in which handling [cassette / of various sizes] is possible, without requiring correction modification of a handling system.
(f) The system which can deal with the substrate of various sizes by correction modification of a system at its minimum.
(g) The handling system which carries out the suspension of each substrate certainly.
(h) The transport station which stops the treatment of a substrate to the minimum as much as possible.
(i) It is the system of low cost for a manufacturer.
[0016]
A means for this invention to load with the cassette which holds the substrate stood perpendicularly automatically, and remove it, A means to transport a cassette within the chamber of a system, and a means to perform conveyance and taking out of a substrate to a substrate carrier in a cassette, These purposes are attained by offering the system equipped with the means where a substrate is aligned for the suspension

within a substrate carrier, the means which carries out the suspension of the substrate within a substrate carrier, and a means to transport a substrate carrier to a series of processing stations where a substrate is processed within a system. This invention is equipped with the means for sealing a processing station using two station isolators again. Each station isolator has incorporated the expansion joint and the closure side, and if started, it will be arranged at the each side of a substrate carrier so that an expansion joint may force a closure side on a mating face on a substrate carrier. Moreover, a substrate carrier forms a processing chamber with the processing barrel attached in each station isolator. Furthermore, a station isolator functions as carrier system for two or more raw gas.

[0017]

With reference to an accompanying drawing, as a desirable embodiment is shown, still more economical, and the system and approach for manufacturing the substrate processed for high quality by high-speed processing are indicated.

[0018]

Detailed explanation of a suitable embodiment It is the design with which there are some kinds of chambers containing a load lock chamber, a transfer chamber, the main chamber, an unload lock chamber, etc. in the substrate processing processing system of this invention, and the all agreed to the requirements for an ultra-high vacuum. The metal seal is used instead of O ring seal made from an elastomer among almost all the joint articles that isolate a vacuum tooth space from the environment of said chamber exterior. Since harmful gas is not contained in the substrate in said system by the ultra-high-vacuum (UHV) maintenance capacity of said system, manufacture of the medium of high quality is possible for said especially system.

[0019]

A substrate is loaded to said system through the load lock chamber 101 alternatively isolated from the environment and said external environment in said transfer chamber. It enters gradually until inert gas, such as nitrogen, will become [said chamber pressure] the same as an atmospheric pressure to said load lock chamber, if said load lock chamber which is well-informed about said environment is opened, and then a gate valve opens, and said load lock chamber is isolated from said atmospheric air. Throughput of a substrate not only improves, but [since a large number are carried by said system by not one sheet but entering a cassette one sheet,] mixing of dust decreases.

[0020]

After one substrate cassette is loaded to said load lock chamber, said load lock chamber is sealed, pumps out air with a native pump, and makes it a low vacuum. Pumping movement falls again and it is made not to make the dust in said chamber which may make a substrate pollute stir. The high vacuum pump isolated alternatively is connected with said load lock chamber by the bulb, said bulb opens, said chamber is made into a high vacuum, and said rough pump valve is closed. Next, a gate valve is opened and said load lock chamber and said transfer chamber can communicate now mutually. Said unload lock chamber 103 functions similarly.

[0021]

Within said transfer chamber 102, the unload of the incompressible substrate is carried out from a supply cassette, and it is loaded to a substrate carrier, and the unload of the processed substrate is carried out from a substrate carrier, and it is loaded to a reception cassette. The direct communication of said transfer chamber is carried out to said main chamber.

[0022]

Said main chamber 104 consists of two or more modules. Each module has one pair or a flange pair beyond it, and the flange of each set has become the flat surface where the opposite side of said system is parallel. Each set of a flange specifies a processing station. Said flange can accept various attachments including a blank plate, instrumentation, a pump, a processor, and a station isolator. It is stopped to the minimum, therefore time amount until it results in the vacuum by the pumping of a system is shortened, and the inner capacity of said chamber reduces the water vapor content which may dew the inside of said system. Since the main chamber is the configuration of module which can be added or removed easily, this machine can be easily constituted so that it can have four or a processing station beyond it. This invention can be optimized to a precedence technical system with a fixed number of stations according to processing of a user or an effective tooth space.

[0023]

Most devices used for conveyance of a cassette or a substrate within said system are the commercial items of the design which suppresses emission of gas, and generating of dust to the minimum, corresponding to a high vacuum. Since said conveyance device cannot be easily influenced by the change on the heart gap by distortion or dimension of thermal expansion or said chamber compared with a precedence technical system, either, problems, such as proofreading, maintenance, and incorrect processing of a substrate, decrease.

[0024]

A vacuum robot is an ordinary z/theta/r shaft robot corresponding to a vacuum which moves a cassette to the inside and outside of a lock, and arranges said cassette in said migration chamber. When a robot is used, it becomes unnecessary to use the complicated conveyor system which needs two or more motors and vacuum rotary feed through which are looked at by the advanced technology, a gear, and a sensor. It is possible for the approach of this invention to simplify said carrier system, to raise cleanliness, and to make the design of said system still more flexible.

[0025]

Said cassette elevator is the ordinary component corresponding to a vacuum attached in said transfer chamber, and it is used in order to lift said cassette and to define a direction so that the center line of said cassette may share the movement shaft of substrate transit.

[0026]

Said substrate transit is the ordinary component corresponding to a vacuum attached in the transfer chamber. It mainly consists of shafts, and while the single movement shaft from a level-luffing-motion location to the location in a substrate carrier and a substrate have between a cassette and a substrate carrier conveyed, it has the end effector which connects with a substrate and is directed.

[0027]

This invention uses the carriage to which the main chamber circumference is moved in support of a new substrate carrier with the alignment means of the substrate which picks up and carries out suspension, and a substrate carrier. Since two or more movements are not needed for deducing a substrate carrier between stations, conveyance is reliable at high speed.

[0028]

Said carrier system is a design which suppresses processing of a substrate to the minimum, therefore damage on a substrate is avoided. Substrate migration is only 4 times. That is, when said substrate is removed from a cassette, said substrate is arranged to said substrate carrier and said substrate is picked out from said substrate

carrier, it is 4 times in case said substrate is returned to said cassette. In a precedence technical system, a substrate is contacted 6 times or more than it. Furthermore, said substrate contacts said periphery no less than 5 times in a precedence technical system, although only a periphery contacts within a substrate carrier.

[0029]

Furthermore, what is necessary is just to exchange the pickup ring of said substrate carrier for the end effector of said substrate transit, in order to receive the substrate with which said carrier system is changed and sizes differ. Large-scale adjustment is unnecessary. Although a stop time may become in several hours when converting a precedence technical system, this has many components which require exchange, and access to a component is difficult for it, and it is because it is necessary to adjust said component carefully.

[0030]

Since it has a new means by which this invention also seals a process chamber, the gas used by processing by the chamber does not pollute the processing generated in other process chambers. The station isolator of the both ends of a processing station creates sealing capacity by forcing a sealing surface on a substrate carrier. If it starts, a process chamber will enable it to also discharge said station isolator in the open air, but since said vacuum environment in said main chamber or a processing station besides the above is not affected, shielding can exchange for a sputtering target easily. Furthermore, said station isolator supplies said raw gas required for the processing in a specific station, and plays the role which emits gas to said substrate under processing at homogeneity. There is an additional function to make it a processing product not make the sealing section of said station isolator pollute in this gas evolution.

[0031]

There is a new processing barrel containing processors, such as a spatter generation source, in this invention. For example, there is a processing barrel in a typical spatter station, and this is attached in the station isolator of the both sides of said station, and the high vacuum pump is directly attached in each processing barrel. Since said pump is directly attached in a processing barrel, the conductivity limit path of a long winding form which is looked at by the precedence technical system is unnecessary. Since a pump is in the both sides of said processing station, by right-and-left contrast, the differential pressure in said chamber is stopped to the minimum, and the processing parameter difference between both ends is also suppressed for a pumping to the minimum.

[0032]

As compared with a precedence technical system, pumping capacity of this invention is far high. There is a pump in each processing station, there is an auxiliary pump in those with two set, and said main chamber and transfer chamber, and said all pumps are directly connected to each chamber. There is also a water trap in said main chamber for removing quickly said lock, said transfer chamber, and a steam.

[0033]

This invention is excellent from a viewpoint on manufacture with some factors. There is little processing which this system is the design which can use as many commercial components as possible, and the remaining order components also have simple structure and requires for manufacture, and it ends, and since said chamber is a modular type, there are no large-sized and expensive components. Since said system is very "opening" structure, even if it is not a processing system designed only for said systems, it is easily applicable including the equipment it is too large to a precedence

technical system so that it may be used for. Flexibility arises, so that there is no precedent in the attachment of a system by this. If a standard flange is used, a design of a new component can be simplified and, as for development and anchoring, a user can do an original processor simply.

[0034]

Drawing 1 and 2 express the outline of said system. The load lock chamber 101 communicates on the external environment and external selection target of said system through a gate valve G1, and communicates also with said transfer chamber 102 and said main chamber 104 through a gate valve G2. A bulb V1 isolates the ordinary high vacuum pump P1 from said load lock chamber 101 alternatively. The port (not shown) for connecting a pump, an ordinary sensor, and ordinary instrumentation is also in the load lock chamber 101 as ******. Although said load lock chamber 101 acts as an environmental interface and a substrate can be loaded to said transfer chamber 102 through this, the vacuum in said transfer chamber 102 is hardly affected. One cassette 210 (drawing 3 A, 3B, 4 and 6) containing two or more substrates can be put into the illustration embodiment of the load lock chamber 101. It is the purpose to be able to put in two cassettes in the alternative embodiment (not shown), to low-speed-ize a pumping, to reduce generating of dust, and to increase a throughput.

[0035]

The transfer chamber 102 is structure, the cassette in it is dealt with, and a substrate is moved to said substrate carrier assembly 501 from said cassette 210, and it is moved to a cassette 210 from an assembly 501 (drawing 5 A). Said transfer chamber 102 may have the object for pumps P3 (drawing 1) and native rough pumping equipment, a sensor, and the port for attachments of instrumentation. Two kinds of embodiments of said transfer chamber are shown in drawing 3 A and drawing 3 B. There is a middle cassette location of an addition in said transfer chamber 102 in another embodiment (not shown), and an additional cassette is contained when required of said 2 cassette load lock chamber.

[0036]

Although the unload lock chamber 103 reproduces the function and structure of said load lock chamber 101, when a substrate and a cassette leave said system, an exception passes through that. Gate valve G3 isolates said transfer chamber 102 from said unload lock chamber 103, and a bulb V2 isolates said transfer chamber 102 from said native high vacuum pump P2 alternatively, and a gate valve G4 isolates said unload lock chamber 103 from said external environment alternatively.

[0037]

Said main chamber 104 consists of two or more chamber modules (drawing 2) containing 201 or 1 drive module, 202 or 1 station module beyond it or the station module 203 beyond it, the idler module 203, and the end module 205. It is carried in the system stand 105 and, as for said main chamber 104 and the transfer chamber 102, this stand also has the part and said control system (not shown) of a utility cable of said station.

[0038]

Each module may have the access port and flange for connecting the member of instrumentation, a pump, a sensor, or others too much.

[0039]

Drawing 3 A, and 3B, 4 and 5 are used for reference in explanation of the degree about said transfer chamber cassette and substrate carrier system. If this system is installed in works, a train will be made and a conveyor, a robot, or a works staff (not

shown) will be accumulated so that one cassette may come to a location C1, until the cassette 210 of delivery and the number of conventions is loaded to said system by said system in a cut.

[0040]

Ordinary 3 shaft atmospheric-pressure robot 302 gathers said cassette in a location C1, inserts this in the load lock chamber 101, and takes down said cassette to up to the cassette locator 303. Said atmospheric-pressure robot 302 also removes a cassette from the locator 303 in said unload lock chamber 103, and arranges the cassette in a location C7. The configuration of said atmospheric-pressure robot's movement shaft is as follows. To a horizontal and the lock chambers 101 and 103, a horizontal, and picking up and arrangement of a cassette are perpendicular between the cassette location C1 and C7. The atmospheric-pressure robot's 302 end effector is a design which engages each of the cassette of standard size at the bottom of a cassette, and arranges and contains a cassette at the core of a shallow hollow. The cassette locator 303 in the load lock chamber 101 arranges a cassette in a right location, and the vacuum robot 301, and 311 (drawing 3 A) or 312 (drawing 3 B) picks it up certainly. Each locator 303 consists of 1 set of guides which take down said cassette and which act as Tokimasa, and it is and are arranged in a location. Said vacuum robots 310, 311, and 312 are multiaxial robots, can function in a vacuum, and a gas evolution is the minimum and they do not generate harmful dust. The vacuum robot 310 moves a cassette to the location C3 in said transfer chamber 102 from the location C2 in said load lock chamber 101, and he moves to a location C4 from a location C3 continuously. Said vacuum robot 311 moves a cassette to a location C5 from a location C4, and makes it move to the location C6 in said unload lock chamber 103 from a location C5 after that. The vacuum robots' 310 and 311 function is combined by the vacuum robot 312 of the alternative embodiment of said transfer chamber 102 (see the drawing 3 B). Each vacuum robot's end effector 315 is a design which connects with the bottom of a cassette either of the various cassettes by which sizes differ, picks it up, and arranges the cassette in the center of a shallow hollow. the vacuum elevators 320 and 321 (or 322 and 323) located under the cassette locations C3 and C5, respectively arrange a cassette 210 so that the center line of a cassette may share the movement shaft of said substrate transit 330 and 340 -- making -- a substrate -- the substrate carrier from a cassette -- or it is used for making it move to the contrary. Said vacuum elevator 320-323 has the end effector 325 which engages the bottom of said cassette in the same way as the case of an end effector 315. The vacuum elevators 322 and 323 of drawing 3 B also have a rotation component, and are aligned with said cassette and said substrate transit 330 and 340.

[0041]

Although each substrate transit 330 and 340 is provisionally arranged in the bore of a substrate 520 (drawing 5), it has the end effectors 331 and 341 which develop and hold a substrate 520 certainly. If it elongates completely, said end effector will reach in said substrate carrier assembly 501 currently displayed on drawing 5 A, and 5B and 5C.

[0042]

Another embodiment of said carrier system can treat a substrate without a center hall. In said alternative embodiment (not shown), it is transposed to the substrate comb, this comb passes through the bottom of a cassette and gets into gear to the lower limit of said substrate, and said elevator end effector 325 lifts said substrate until the center line of a substrate becomes the movement shaft and straight line of said substrate transit 330 and 340. It is transposed to the end effector with which the end effectors

331 and 341 of each substrate transit 330 and 340 also gear to the outer edge of said substrate. If these two modification is removed, the principle of operation of said priority embodiments and these alternative embodiments is the same.
[0043]
Speaking of drawing 2 , and 5A and 6, the substrate carrier assembly 501 is conveyed through each processing station S1-Sn in the perimeter of said main chamber 104, holding said substrate 520. Said substrate carrier assembly 501 consists of a paddle 503 and a pickup ring 505, and is attached in carriage 610. Both sides of said paddle have played a role of a sealing surface of the station isolator 801 (it displays by 8B from drawing 7).
[0044]
In a certain embodiment, there is an O ring slot where O ring 502 is contained in each field, and said station isolator is sealed by it. In the another embodiment (not shown), each field is smooth and the elastomer seal of said station isolator seals it to the field. Said pickup ring 505 is attached in said paddle 503.
[0045]
Said pickup ring has the two-set pickup 510 and 515, and three pickup per each set is arranged around said pickup ring 505. Each of six pickup has a pivot point and pickup rotates it centering on the point. It rotates and operates centering on said pivot point, and said pickup gears to a substrate 520, and said pickup 510 and 515 removes engagement. After said substrate transit 330 arranges a substrate 520 in said substrate carrier assembly 501, although said alignment pickup 510 engages said substrate 520 to V typeface notch 511 (drawing 5 B), this notch arranges said substrate 520 focusing on shaft orientations in said substrate carrier 501, and it arranges it in the right location within the field decided by the notch of three pickup of that substrate. If it becomes "finishing" arranging said substrate 520, the primary pickup 515 gears to said substrate 520, and it will rotate and it will separate from said alignment pickup 510 from a position. The shallow hollow 516 of said primary pickup 515 (drawing 5 C) holds said substrate 520 certainly, and suppresses overlap with said substrate side, and interference during processing to the minimum. Furthermore, said pick amplifier 510 and 515 has the compliance which offsets the thermal expansion of a substrate 520 to some extent.
[0046]
After a substrate 520 is processed, the substrate transit 340 arranges said end effector 340 in the center hall of said substrate 520. Said primary pickup 515 is drawn from said substrate 520, and said end effector draws in said substrate 520, and removes this until it gears to said center hall and said substrate 520 comes on the first effective cassette slot. Said elevator 321 (or 323) lifts said cassette until said substrate 520 is arranged in said slot. Said transit 340 releases said substrate 520 next, and draws it completely. Said elevator 321 (or 323) descends until substrate 520 another next is arranged on it.
[0047]
Drawing 2 , and 3, 4, 6 and 7 are used for reference by explanation of the following related with said main chamber carrier system. Carriage 610 supports the substrate carrier assembly 501, and has the bearing set which enables it to move the substrate carrier assembly 501 along with the surrounding rail 611 of said main chamber 104 as shown in drawing 6 . As for the rail 611, an installation eclipse and this are attached in structure 612 at said main chamber. If there is fixed compliance in said carriage and said station isolator 801 operates, said carriage 610 and the substrate carrier assembly 501 will be arranged in a right location, and alignment will be made for radial and

shaft orientations by the present processing station and accuracy.
[0048]
The metal belt 620 is ultra-high-vacuum correspondence, and is not the remarkable generation source of dust. A belt goes across the driving pulley 220 in the drive module 201, and the idler pulley 221 in said idler module 204, is lengthened, and pulls said surrounding carriage 610 of the main chamber 104. There are the carriage and the substrate carrier of N+1 in said system, and N is the number of processing stations here. Said carriage 610 is attached in the belt 620 so that a certain amount of independent movement can be performed, but when carriage 610 passes the curvilinear part, the contiguity driving pulley 220, and idler pulley 221 of said rail, it needs the movement. The ordinary drive motor 350 is connected with the driving pulley 220 with ordinary vacuum rotary feed through and an ordinary ordinary coupler (not shown). Whenever a drive motor 350 operates, carriage 610 and the substrate carrier assembly 501 are deduced at the next station.
[0049]
8C is referred to from drawing 6 by explanation of the following related with said process station. Each of the main chamber module is the both ends of said chamber, and has at least 1 set of station flanges 206 (drawing 1) in the parallel side which has faced mutually. There is a chamber module with one pair of flanges, and there is a thing with two pairs or four pairs of flanges. These flange pair 206 specifies a processing station. By changing a modular number and a modular class, it is possible to change the number of the processing stations in a system. Said station flange 206 can accept many attachments including a blank-off plate, a pump, a processor, and the station isolator 801 (drawing 7).
[0050]
Sealing isolation of the station for which especially a station needs raw gas needs to be carried out from other stations and said main chambers 104. In the embodiment with a station isolator, the isolator of a pair puts in pressurization gas alternatively to an expansion joint 802 (drawing 8 C), and operates by making O ring 502 of both sides of said paddle 503 (drawing 7) force a sealing surface 803 on an expansion joint 802.
[0051]
Speaking of drawing 7 , the ordinary pumping equipment P4 attached at the tip of the process barrel 701 attached in one pair of station isolators 801 and each isolator 801 to the both ends of said substrate carrier assembly 501 and each process barrel 701 is contained in the typical embodiment of a spatter station. Actuation of said station isolator 801 operates the substrate carrier assembly 501, the station isolator 801, the processing barrel 701, and a pump P4 together as a process chamber 750 (drawing 7) by which sealing isolation is carried out from said main chamber 104.
[0052]
Another function of said station isolator 801 is introducing raw gas into said process chamber 750. Since the orifice into which said raw gas is made to introduce is annularly arranged around said station isolator 801, said gas is introduced at a fixed rate, as shown in drawing 8 A. Furthermore, the flow of said gas also plays the role with which an ingredient prevents reaching the contact part of said O ring. Otherwise, it has a bad influence on the sealing engine performance. Said station isolator 801 functions also as a mounting flange for [, such as the processing barrel 701 (drawing 7), / various] attachments.
[0053]
The processing barrel 701 consists of inner tubes 703 currently supported in the outer

tube 702 with the outer tube 702 and the tube 704 extended to the radial from the inner tube 703 to the outer tube 702. If the sputtering generation source 730 is installed in an inner tube 703, sealing isolation of the space surrounded by the generation source 730 and the inner tube 703 will be carried out from the space between an outer tube 702 and an inner tube 703. When said system is a vacua, the volume in an inner tube 703 stops atmospheric pressure. The tube 704 which has hung the inner tube 703 in said processing barrel 701 enables utilities, such as water and an electric wire, to reach to said sputtering generation source 730.

[0054]

Housing of the processing barrel 701 or a processor does not necessarily need to be in agreement with the above-mentioned explanation. In essence, it may only be required to maintain the environment isolated from the exterior of said system, and housing of a processor may have the flange or the anchoring point for a pumping, a sensor, or other devices in said housing, or may not be.

[0055]

The high vacuum pump P4 of an option is attached in a station or the processing barrel 701, and this plays the role which extracts the gas of a process chamber, while the gas of said main chamber 104 is extracted when said station isolator 801 is open, and the station isolator 801 is operating. A pump P4 may have the native throttle valve which may have the native bulb alternatively isolated from the process bulb 701, and/or adjusts a pumping rate.

[0056]

The process bulb 701 can be attached in the station slide assembly 740 with which said station is supported, when it separates from said station isolator 801, or when the station isolator 801 separates from the station flange 206. It is pulled away from the main chamber, it rotates and the process barrel 701 is arranged simply in the location 760 which can be maintained.

[0057]

A high vacuum pump P5 (drawing 1) functions on the station flange 206 as a direct attachment eclipse and a main chamber pump.

[0058]

A control system (not shown) uses the complements of the programmable logic controller which controls one computer and said system also at the lowest including a bulb, a motor, a sensor, a gas flowmeter, a pump, a regulator, a power source, etc. A user interface (not shown) gives an interface between said control systems with said operator.

[0059]

Actuation The operating instructions of this invention are explained by by describing movement of the single substrate 520. In a typical example, a substrate 520 is held together with other 24 substrates at a cassette 210. As this depiction, said system does not have a substrate in it at first, but all the gates are closed, and the loaded cassette of C1 is a base pressure, and, as for the empty cassette of the unload elevators 321 and 323 in the location C5 which plays the role of the container of a processed substrate, ready. [actuation] About the process which loads an empty cassette, the cassette of C1 becomes clear by reading the explanation about how it is loaded.

[0060]

Speaking of drawing 3 A, if nitrogen is gradually emitted to said load lock chamber 101, a pressure will be improved to atmospheric pressure (760 Torr). The gate G1 opens, the atmospheric-pressure robot 302 lifts said cassette from a location C1, moves said cassette directly before said load lock chamber 101, and extends and takes

down to said load lock 101, and said cassette is put on said cassette locator 303 of C2. Said robot 302 draws automatically next, moves to under the following cassette, and goes to a location C1. The gate G1 is closed and sealed.
[0061]
The load lock chamber 101 carries out a pumping to a low vacuum through an ordinary roughing pump (not shown). A bulb V1 is opened, and in said chamber, a pumping is further performed until the vacuum level in said load lock chamber 101 becomes almost the same as it of said transfer chamber 102 with a pump P1. The gate G2 is opened.
[0062]
The vacuum robot 310 lengthens the end effector 315 to the load lock chamber 101, he lifts said cassette from said cassette locator 303, draws it, rotates, puts said cassette on the location C3 on the vacuum elevator 320 and 322, and takes down said cassette on said elevator 320 and 322. Said robot draws from elevators 320 and 322 next.
[0063]
Closing bulbs V1 and G2, the load lock chamber 101 is again returned to atmospheric pressure, and enables it to load the following cassette.
[0064]
If the vacuum robots 310 and 312 become empty, it will go up until the center line of the vacuum elevator 320 of said cassette corresponds with the movement shaft of said substrate transit 330. Elevators 322 and 323 must also be rotated in the alternative embodiment of drawing 3 B. The substrate transit 330 is extended until said end effector 331 is arranged in the bore of the first (usually 25th slot of said cassette) substrate 520 with which it encounters. Elevators 320 and 322 descend until they separate from said substrate 520 with which the upper part of said cassette is hung on said substrate transit 330 next.
[0065]
If a substrate 520 separates from said cassette, said end effector 331 will be extended until said substrate 520 is held certainly. A substrate 520 is in an ideal thing here in a field parallel to the substrate carrier assembly 501. The substrate transit 330 is extended until it adjoins said substrate carrier assembly 501. The substrate transit 330 is extended until it shares the field where said substrate 520 was specified by said three alignment pickup 510 of the substrate carrier assembly 501 below.
[0066]
By the grip and it, the alignment pickup 510 makes said substrate 520 emit to an end effector 331, and draws the outer edge of said substrate 520 in it completely. As for the primary pickup 511, a grip and the alignment pickup 510 draw a substrate 520 next.
[0067]
If the substrate transit 330 separates from the substrate carrier assembly 501, the substrate carrier assembly 501 is deduced in the location S1 (refer to the first processing station and drawing 6) of a degree, and can carry out coincidence 1 station indexing of all the substrate carriers in said main chamber 104. At the time of continuation actuation, the processing currently performed at each processing station is completed, and indexing is not performed until said station isolator 801 draws and it becomes a location. If said substrate transit 330 moreover draws completely, the cassette elevator 320 will go up again automatically, and the following substrate will be moved. When said substrate carrier assembly 501 is arranged at a position, the next substrate in said cassette is loaded.
[0068]

A halt of said motor which is driving said indexing movement operates the station isolator 801. It becomes the separate process chamber 750 (drawing 7), sealing isolation is carried out from all other stations and said main chambers 104, and each station can start processing. Those knowledgeable of said technique need one or more processes, and he can understand that it is necessary to change the number and class of processing to performing substrate coating with a special property. Said processing and sequence are not indicated by the detail here. Although a substrate 520 is heated first and then it goes to a series of spatter stations in a typical example, it is not common that the processor of other classes is used. At a spatter station, raw gas, such as an argon, is emitted to said sealing process chamber 750, and the plasma is generated. Even if each isolation process chamber 750 uses different gas by different pressure, there is no effect in other stations. It is possible to process the both sides of a substrate to coincidence. If said gas pressure in each process chamber is suitable, processing will begin. If each processing is completed, in order to make said process chamber into a vacuum appropriately and for the station isolator 801 to retract on it, the gas in the process chamber 750 of arbitration will not mix it in other stations or these systems.

[0069]

Although the station isolator 801 has the additional function a station enables it to open for repair when it operates, said vacuum environment of said main chamber 104 is not barred. In order to fix, actuation is interrupted temporarily, the power source to a stop and said station is taken for the pumping of a station, nitrogen is removed from said station outside, and a pressure is made into atmospheric pressure. If said barrel is removed from said isolator 801, access into said barrel or said station will be attained. After repair, said station is closed and, subsequently even to a low vacuum, the pumping of said process chamber is carried out to a high vacuum. The quiescent time will be shortened if the discharge of the station of said chamber 104 and others is avoided.

[0070]

After said substrate 520 arrives at each station and returns to the transfer chamber 102, the substrate transit 340 arranges elongation and its end effector 341 in the bore of said processed substrate 520. Said primary pickup is retracted from said substrate 520, and changes said substrate 520 into the condition of having geared to said end effector 341. The substrate transit 340 is drawn in the beginning in the elevator 321 of a location C5, and said unload cassette on 323 to the location on an usable slot.

[0071]

Said cassette of a location C5 is lifted until said substrate 520 of said unload substrate transit 340 enters in said cassette. Next, it is removed from said substrate 520, said substrate transit 340 is retracted, and said substrate 520 changes said end effector 341 into the condition of having gone into said cassette 210. Said unload elevators 321 and 323 descend next, and it waits for them until the following substrate 520 is removed from said substrate carrier 501.

[0072]

If said cassette of a location C3 becomes empty, a cassette will move to a location C4 and said cassette of said load lock chamber 101 of a location C2 will move it to a location C3. If said cassette of C5 fills, a cassette will move to said unload lock chamber 103 of a location C6, and said empty cassette of C4 will move it to a location C5. If said cassette is arranged at said unload lock chamber 102, said bulb V2 and G3 will be closed, and said unload lock chamber 103 will be gradually made into a vacuum. If a pressure becomes an atmospheric pressure, a gate valve G4 will open

and said environmental robot 302 will remove said cassette.
[0073]
Thus, by practicing this invention, a system and an approach are more economical approaches and the substrate with the thin film of high quality is more simply prepared for the processing using the processing system which can be maintained.
[0074]
Although this invention is explained here with reference to the specific embodiment, it will be understood that modification can be added without deviating from the intention of this invention. Therefore, the range of this invention is defined by the following claim.
Easy explanatory view 1 of a drawing It is the top view of the desirable embodiment of this equipment.
Drawing 2 It is the side elevation of the direction of the arrow head 2-2 of the embodiment of drawing 1 .
drawing 3 A [ ] it is the top view of a cross section along the flat surface 3-3 of drawing 2 which passes along the embodiment of drawing 1 showing the detail of the robot concrete supply system characterized by the congruence robot migration chamber.
drawing 3 B [ ] it is the top view of a cross section along the flat surface 3-3 which passes along another embodiment of the robot concrete supply system characterized by the single robot migration chamber.
drawing 3 C [ ] it is the enlarged drawing of drawing 3 A showing a migration chamber.
Drawing 4 It is the front end side Fig. of a cross section along the flat surface 4-4 of drawing 2 which passes along the embodiment of drawing 1 . drawing 5 A [ ] the desirable operative condition of a substrate carrier assembly -- it is an elevation [like].
drawing 5 B [ ] the desirable operative condition of the alignment pickup for aligning and supporting a substrate -- it is a schematic diagram [like].
drawing 5 C [ ] the desirable operative condition of the first pickup supporting a substrate -- it is a schematic diagram [like].
Drawing 6 It is the side elevation of a cross section along the flat surface 6-6 which passes along the embodiment of drawing 1 .
Drawing 7 It is the partial side elevation of a cross section along the flat surface 7-7 which passes along the embodiment of drawing 1 showing the migration means of the main chamber.
drawing 8 A [ ] it is the front sectional view of a cross section in alignment with flat-surface 8A-8A of drawing 4 which passes along the desirable embodiment of a station isolator.
drawing 8 B [ ] the desirable operative condition of a station isolator -- it is a sectional side elevation in alignment with flat-surface 8B-8B of drawing 8 A [like].
drawing 8 C [ ] it is the enlarged drawing of the expansion joint of drawing 8 B.

2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] Load lock chamber which passes at least one substrate The unload lock chamber which passes at least one substrate, With the vacuum robot which moves substrate to a transfer chamber from this load lock chamber, and moves this substrate to this unload lock chamber from this transfer chamber The transfer chamber to which substrate goes and comes back between substrate carriers, The vacuum elevator for positioning this substrate on the motion axes of the substrate transportation way in this transfer chamber, The substrate transportation way which carries out both-way migration of each substrate between substrate carriers, substrate carrier to which substrate is moved involving the main vacuum chamber the truck mold to which it shows this substrate carrier involving the main vacuum chamber and by which orientation was carried out to the vertical -- with a course Substrate space transportation system which contains the extensible main vacuum chamber including at least one main chamber module which has processing station until some main chamber modules are included.
[Claim 2] On each flank of said processing station A processing gas is sent out and it is the station isolator in which a seal is possible to each flank of said substrate carrier. System according to claim 1 by which both this station isolator on each flank by which the seal was carried out to this processing station and the substrate carrier including the processing module which carries out the seal of this station from an external environment, and this processing module on each flank form a processing chamber further.
[Claim 3] The system of each of said station isolator according to claim 2 which contains the expansion joint which can be expanded and contracted so that the seal of this isolator may be carried out to said substrate carrier and seal isolation of the substrate in this carrier may be carried out from the other parts of said main vacuum chamber, respectively.
[Claim 4] The system according to claim 3 by which said station isolator has an orifice a circular pattern around this station isolator, and sends out said processing gas.
[Claim 5] It is a system [available as a loading flange] according to claim 3 about said station isolator.
[Claim 6] Said processing module Source of processing The inner tube which extends from one flank of this source of processing, The outer tube which is located in the perimeter of a this inner tube, and has a shaft parallel to the shaft of this inner tube, Utility piping which connects a this inner tube to this outer tube System according to claim 2 by which seal isolation of the space in this inner tube is carried out including the included processing barrel section from the interior of the outside space of this inner tube, this utility piping, and this outer tube.
[Claim 7] The system according to claim 6 by which said inner tube is maintained at ambient pressure, and said utility piping introduces a utility in this inner tube.
[Claim 8] The system according to claim 6 by which said source of processing includes the source of sputtering.
[Claim 9] The system according to claim 2 by which said substrate carrier includes the 1st and 2nd sets of the pickup which positions said substrate in the center in this

substrate carrier.
[Claim 10] In case said carrier moves involving said main vacuum chamber, the 1st group of said pickup Two or more main pickup which holds a substrate by pinching a substrate in the center according to the force of a spring, and holding the rim certainly is included. The 2nd group of said pickup extends so that this substrate may be appropriately held by these main pickup, and it positions this substrate. A system including two or more positioning pickup which will retreat if this substrate is held by these main pickup and which has been arranged around this substrate carrier according to claim 9.
[Claim 11] The system according to claim 2 which contains further the station sliding section in which said processing station supports this barrel section in case said barrel section is separated from said main vacuum chamber.
[Claim 12] The system according to claim 11 by which aeration is possible for each processing chamber, and said processing module may be separated from said station isolator by that cause.
[Claim 13] The system according to claim 2 by which said main vacuum chamber has at least one processing station, respectively, and contains another main chamber module and two or more main chamber modules in which said transfer chamber and fitting are possible.
[Claim 14] Each of said processing module has the high vacuum pump of dedication, these other processing modules become independent, and it is the system according to claim 13 which can perform coating processing.
[Claim 15] The system according to claim 14 whose module with said various processing modules is exclusively for different processing.
[Claim 16] The system according to claim 1 by which said processing chamber can support a high vacuum pump.
[Claim 17] The system of said main vacuum chamber, said load lock chamber, and said unload lock chamber according to claim 1 which has each rough vacuum pump and each high vacuum pump, respectively.
[Claim 18] The system according to claim 1 by which said transfer chamber has a high vacuum pump.
[Claim 19] The system according to claim 1 which includes further the conveyance means for inserting a cassette into said load lock chamber, and taking out this cassette from said unload lock chamber.
[Claim 20] The system according to claim 1 which includes further the migration means for supporting and moving said substrate carrier to said line on the street.
[Claim 21] The system according to claim 20 which includes further the means for performing alignment for every station of said all substrate carriers to coincidence by carrying out alignment of said migration means intermittently.
[Claim 22] The system according to claim 1 which said substrate conveyance way can position in the main hole of a substrate, it has the end effector which is elasticity so that the core of this substrate may be held certainly, and it makes move a substrate to said substrate carrier from said cassette.
[Claim 23] It is a substrate processing system. Main vacuum chamber At least one processing station which adjoined this main vacuum chamber, The load lock chamber which has load inlet-port opening which attached the door in which 1st sealing is possible, and load outlet opening which attached the door which can seal the 2nd, The unload lock chamber which has unload inlet-port opening which attached the door in which 3rd sealing is possible, and unload outlet opening which attached the door which can seal the 4th, The transfer chamber migration means for conveying said

substrate inside a transfer chamber from said interior of a load lock chamber, and conveying this substrate inside [this] an unload lock chamber from this interior of a transfer chamber, The transfer chamber which has entry opening which adjoins the this 2nd door, and outlet opening which adjoins this 3rd door, and is carrying out opening to this main vacuum chamber, The transfer chamber load and unload means for conveying this substrate from this transfer chamber migration means to the main chamber migration means and from this main chamber migration means to this transfer chamber migration means, Two or more substrate carriers of each which have the 1st seal means on one flank are included. By equipping the flexible annular means of transportation which goes back and forth between one processing station, and conveys this substrate even if there is none of these **, and performing to coincidence alignment for every station of these all substrates located on this means of transportation A main chamber migration means by which each substrate is continuously processed in each of this processing station, and this substrate is processed by coincidence also at these all other processing all [either or], Even if an implication and this ** are not, one processing station if it operates -- this -- the system which has the station isolator equipped with the 2nd seal means which isolates this processing station from this main vacuum chamber by engaging with the 1st seal means and forming a seal on one flank.

[Claim 24] The system according to claim 23 by which said transfer chamber migration means contains the end effector for supporting a substrate certainly, transporting it and positioning it in said transfer chamber.

[Claim 25] The system according to claim 24 which includes further the atmospheric-air robot means for introducing said substrate in said load lock chamber, and taking out a substrate from said unload lock chamber out of said system.

[Claim 26] The system containing an end effector for said atmospheric-air robot means to support the cassette containing a substrate certainly at the time of migration according to claim 25.

[Claim 27] The system according to claim 24 by which said transfer chamber load and an unload means include a vertical migration means and a level migration means.

[Claim 28] The system according to claim 27 by which said vertical migration means positions said substrate so that it may engage with said level migration means.

[Claim 29] The system according to claim 27 by which said vertical migration means can descend to a low order location so that actuation of said level migration means may not be interrupted.

[Claim 30] The system according to claim 27 by which said vertical migration means can support said substrate certainly including two or more end effectors at the time of transportation of the direction of a vertical.

[Claim 31] The system according to claim 27 by which said level migration means is positioned in the main hole of said substrate, and contains the end effector which will hold this certainly if it operates.

[Claim 32] The system according to claim 31 which may be positioned in the 1st location where said end effector does not interfere in actuation of the direction of a vertical of said vertical migration means.

[Claim 33] The system according to claim 32 which may be positioned in the 2nd location where said end effector adjoined said main chamber migration means directly.

[Claim 34] The system according to claim 31 which may be further positioned in the flat surface of a substrate said whose end effector is a candidate for pickup.

[Claim 35] The system according to claim 23 by which said substrate has a main hole.

[Claim 36] The system according to claim 23 by which each contains this substrate

and two or more substrate carriers which can hold one sheet certainly while the time of both-way migration with said processing station of said substrate and this substrate have said main chamber migration means in this processing station.
[Claim 37] The system according to claim 36 which enables arrangement into this carrier of this substrate, removal from this carrier, and support by this carrier by including two or more main pickup alternatively engaged in two or more points of said substrate carrier located on the periphery section of said one substrate, respectively.
[Claim 38] The system according to claim 37 by which said main pickup includes shallow "V" mold edge which engages said substrate with along an edge, respectively.
[Claim 39] After said substrate is arranged in this carrier, before [said substrate carrier] being engaged by said main pickup, respectively, two or more points located on the periphery section of this one substrate by being engaged alternatively A system including two or more positioning pickup which will retreat from this substrate if the function to position this substrate is achieved so that it may be engaged by these main pickup, and these main pickup is engaged in this substrate according to claim 37.
[Claim 40] The system according to claim 39 which said positioning pickup engages said substrate with along an edge including "V" mold edge deeper than the aforementioned "V" mold groove of said main pickup, respectively, and positions this substrate in the center of the inside of said carrier still more correctly.
[Claim 41] The system according to claim 36 by which said substrate is removed from said carrier, and is carried on this carrier when said carrier is positioned in loading / unload location in said transfer chamber.
[Claim 42] The system according to claim 23 by which said main vacuum chamber, said load lock chamber, and said unload lock chamber include further a rough-vacuum-pump means and a high-vacuum-pump means.
[Claim 43] The system according to claim 42 by which said transfer chamber contains the high vacuum pump of dedication.
[Claim 44] The system according to claim 23 which can perform vacuum coating processing in the station chosen among these processing stations when said some of processing stations contained the high vacuum pump of dedication, respectively.
[Claim 45] The system according to claim 23 by which each of said processing station is exclusively for specific processing, and processing different generally at various stations of these processing stations is performed.
[Claim 46] The system according to claim 23 by which said processing station is arranged in the shape of an abbreviation rectangle, and said lock chamber and said transfer chamber are arranged at the end section.
[Claim 47] The system according to claim 23 which performs alignment for every station to coincidence about said all substrates in this main chamber when said main chamber migration means carries out alignment of this main chamber migration means intermittently.
[Claim 48] The system according to claim 23 by which one of said the seal means contains an elastomer seal.
[Claim 49] The system according to claim 23 which carries out aeration of each processing station by supplying inert gas until it operates said 2nd seal means, it interrupts the pump impregnation in said processing station and this processing station reaches atmospheric pressure.
[Claim 50] The system according to claim 23 by which said station isolator contains the sending-out system which sends out a processing gas to homogeneity to said substrate in said processing station.

[Claim 51] The system according to claim 50 which orients said processing gas so that said sending-out system may prevent the contamination on said front face of a seal and degradation of this seal engine performance by the particle matter.
[Claim 52] The system according to claim 23 which contains the processing barrel section in which said processing station forms the processing chamber which was isolated from the main chamber and became independent with said one pair of station isolators on each flank.
[Claim 53] The system according to claim 52 by which said processing barrel section carries out the suspension of the source storing section which is open for free passage with the exterior of said system with tubing to the shape of the same axle.
[Claim 54] The system according to claim 53 which can send out a utility to said source with said tubing.
[Claim 55] The system according to claim 52 by which the station sliding section which supports this barrel in case this barrel section is separated from said station isolator, or in case this station isolator is separated from said main vacuum chamber may be equipped with said processing barrel section.
[Claim 56] It is a system [available as a loading flange] according to claim 23 about said station isolator.
[Claim 57] The system according to claim 23 to which said means of transportation shows migration of said substrate carrier including the course by which orientation was carried out to the vertical.
[Claim 58] The system according to claim 57 which includes further a transportation means to move in support of said substrate carrier in the perimeter of said main vacuum chamber.
[Claim 59] Step which carries a substrate in a load lock chamber The step which isolates this load lock chamber, The step which carries out pump impregnation of the high vacuum at this load lock chamber, The step which makes this load lock chamber open for free passage with a transfer chamber, The step which transports this substrate to the transfer chamber load means inside this transfer chamber from this load lock chamber, The step which arranges this substrate using this transfer chamber load means in loading / unload location on the main chamber migration means, Step which carries out the suspension of the this substrate into this main chamber migration means Until this substrate is processed in at least one of these the processing stations and it returns to this loading / unload location The step which carries out sequential positioning of this main chamber migration means at each of two or more processing stations, The step which takes out the processed this substrate from this main chamber migration means using transfer game van load means, Step which transports the processed this substrate to an unload lock chamber from a transfer chamber Substrate art containing the step which takes out the processed this substrate from this unload lock chamber.
[Claim 60] The approach containing the step to which the step which isolates said load lock chamber closes and carries out the seal of the door according to claim 59.
[Claim 61] The approach containing the step to which opening of the 1st valve is carried out, and the step which carries out pump impregnation of said load lock chamber carries out pump impregnation of the low vacuum, carries out opening of the 2nd valve to this chamber, carries out pump impregnation of the high vacuum at this chamber, and closes this 1st valve according to claim 59.
[Claim 62] The approach according to claim 59 the step which makes said load lock chamber open for free passage with a transfer chamber contains the step which carries out opening of the door between this load lock chamber and this transfer chamber.

[Claim 63] The step positioned in the flat surface where the step which carries out the suspension of said substrate is engaged in this substrate at this the edge using two or more positioning pickup arranged at said main chamber migration means, and this pickup specifies this substrate, By the step which breaks away and retreats the level migration means by the side of said loading, and two or more main pickup arranged at this main chamber migration means The approach containing the step which supports this substrate also while this substrate is engaged in the rim section, retreating this positioning pickup and moving to each of said processing station according to claim 59.
[Claim 64] The approach according to claim 59 said step which carries out sequential alignment can carry out alignment of said all substrates transported by said main chamber migration means by using a motor to coincidence for every station.
[Claim 65] The approach according to claim 59 said step which carries out sequential alignment processes the substrate in each processing station in distinction from the processing currently performed to coincidence at other stations of said processing station.
[Claim 66] Said step which carries out sequential alignment pushes a dynamic seal with a station isolator on the static seal of said main chamber migration means by which it is located on each flank of this main chamber migration means. By isolating said processing station from the perimeter, and forming a seal A processing gas is sent out to homogeneity to said substrate through the step which forms a processing chamber, and this station isolator in this processing chamber. The approach containing the step of which the isolation condition of this processing station is canceled by starting this processing, completing this processing, exhausting this the greater part of gas from this processing station, and retreating this dynamic seal from this static seal according to claim 65.
[Claim 67] The approach according to claim 66 said exhaust air step uses said processing station and a pump open for free passage.
[Claim 68] The step to which the step which uses said transfer game van load means extends the level migration means by the side of an unload until an end effector is positioned in the flat surface of said substrate, The step which retreats said main pickup after this substrate has engaged with this end effector, The step which retreats the level migration means by the side of this unload until this substrate is located on the vertical migration means by the side of an unload, The approach containing the step which this substrate is lifted [step], makes this end effector secede from this substrate, retreats the level migration means by the side of this unload, and drops this substrate according to claim 59.
[Claim 69] The approach according to claim 59 of containing further the step which repeats the step which uses said transfer chamber load means after each alignment step, and arranges one of said substrates on said main chamber migration means.
[Claim 70] after the step in which said substrate is carried made it descend until it carried a substrate in said load lock chamber using the 1st migration means and came this substrate on two or more pickup -- this -- the method according to claim 59 of retreating the 1st migration means from this load lock chamber.
[Claim 71] The method according to claim 70 of the step which transports said substrate from said load lock chamber extending an end effector under a substrate in this load lock chamber, lifting this substrate from these two or more pickup using the 2nd migration means, moving this substrate into this transfer chamber, and positioning this substrate on the vertical migration means by the side of loading.
[Claim 72] The step using said transfer chamber load means The step which offers the

cassette holding said substrate, The step which this cassette is lifted using the vertical migration means by the side of said loading, and the level migration means by the side of loading extends an end effector in the central hole of this substrate, and enables it to engage this, This cassette is dropped using the vertical migration means by the side of this loading to the location which does not interfere in the level migration means by the side of this loading even if the level migration means by the side of this loading extends to said loading / unload location of said main chamber migration means. The approach according to claim 71 of containing further the step which arranges this substrate in the location within this main chamber migration means.
[Claim 73] The approach according to claim 72 of containing further the step which moves the cassette which became this empty using said 2nd migration means to a position in readiness, and moves the new cassette carrying an unsettled substrate onto the vertical migration means by the side of said loading after carrying said all substrates from a cassette by the step using said transfer chamber load means.
[Claim 74] The approach according to claim 73 of containing further the step which moves said empty cassette from said position in readiness to the location on the vertical migration means by the side of said unload, and holds said processed substrate.
[Claim 75] The approach according to claim 74 of containing further the step which picks out this full-load cassette from said system through an unload lock chamber, after making a hold cassette a full load by said hold step.
[Claim 76] An elevator is descended until it conveys said substrate to said substrate transportation on the street and this substrate disappears from on said cassette by the step using said transfer chamber load means. Said step which carries out suspension The step which elongates an end effector until this substrate is held certainly, Step which extends until it shares the flat surface where a this substrate transportation way is specified at the flat surface of this substrate by two or more positioning pickup in said substrate carrier By grasping this substrate by this positioning pickup Step to which this end effector releases this substrate and retreats to the position in readiness Approach containing the step which this substrate is grasped [step] by two or more main pickup, and retreats this positioning pickup according to claim 70.

[Translation done.]